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# *Forest Pest Management*

## *Pacific Northwest Region*

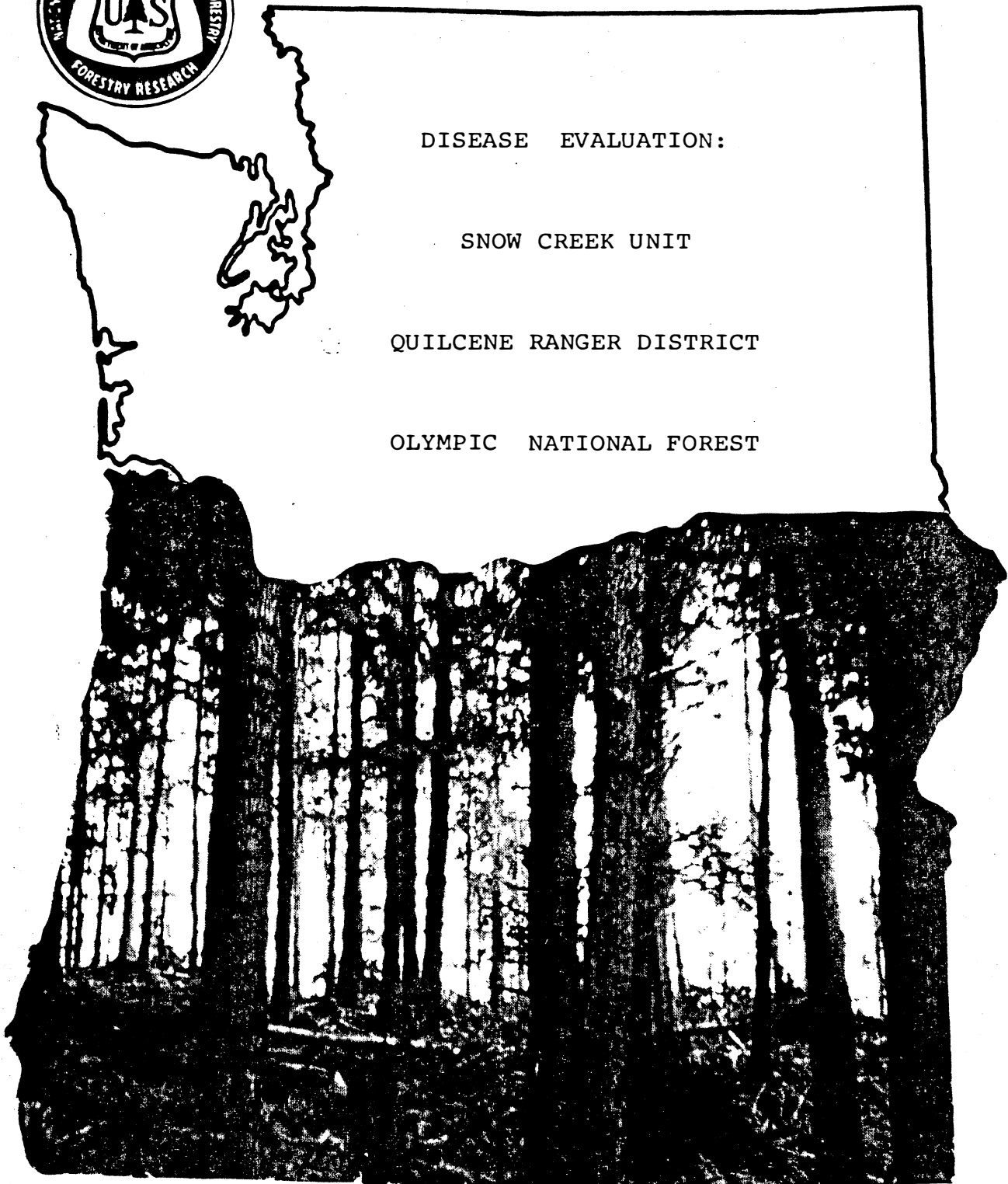


DISEASE EVALUATION:

SNOW CREEK UNIT

QUILCENE RANGER DISTRICT

OLYMPIC NATIONAL FOREST



Disease Evaluation: Snow Creek Unit  
Quilcene Ranger District, Olympic National Forest

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INTRODUCTION

During the week of September 8, 1980, a disease survey was done on a portion of the Snow Creek Plantation, Quilcene Ranger District, Olympic National Forest. The stand surveyed consisted of about 33 acres located in T28N, R2W, Sec. 8 (figures 1 and 2). While preparing a silvicultural prescription for the stand, District personnel had noticed some evidence of root disease and also had become concerned about the possibility of decay in broken tree tops. They requested an evaluation to determine extent and severity of diseases in the stand and to provide disease management recommendations.

METHODS

The stand was surveyed systematically with variable plots (BAF 20) located on a 2 x 5 chain grid across the stand. This resulted in approximately a 4 percent cruise.

At every fifth healthy plot (plots containing no symptomatic trees) and all diseased plots (plots containing one or more dead or symptomatic trees), each "in" tree was tallied and the following information recorded: (1) species, (2) DBH, (3) condition (live, recently killed, snag, stub, harvested stump, or dead down), and (4) disease involved, if appropriate. In other healthy plots, a stem count by species was done, but diameter data were not collected.

All trees in every plot were examined for top crook or sweep  $\geq$  3 inches (indicative of an old top break). A subsample of trees that displayed old top breaks was felled and examined. Disks were removed from the break and stem below the break and returned to the laboratory for measurement and culturing of possible decay fungi.

All trees in plots that had dead or symptomatic trees, were examined for root diseases. Two roots on opposite sides of each tree were excavated to a distance of 3 feet from the root crown. Root surfaces were checked for ectotrophic mycelium of *Phellinus (Poria) weirii*. On dead and symptomatic trees, the bark was removed and the cambial zone was examined for mycelial fans of *Armillaria mellea*. Finally, root wood was examined for laminated decay caused by *P. weirii*, yellow-stringy decay caused by *A. mellea*, or white-stringy decay caused by *Fomes annosus*.

Mean basal area per acre, number of trees per acre, and volume per acre, were calculated for the stand by species, DBH class, and disease condition using the Region 6 VPLLOT computer program.

### RESULTS AND DISCUSSION

The stand surveyed was composed predominantly of Douglas-fir (*Pseudotsuga menziesii*) with scattered western redcedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*). The unit was planted with Douglas-fir in 1928, and thinned in 1968. Current mean basal area, number of trees, and board foot volume are summarized in tables 1, 2, and 3.

Two root diseases were detected in the stand, laminated root rot, caused by *P. weirii*, and Armillaria root rot, caused by *A. mellea*. Basal areas, number of trees, and volume per acre affected by root disease are summarized in tables 4, 5, and 6.

Laminated root rot was detected in two of 23 plots (8.7 percent) in the south-central portion of the survey area (figure 3). Two and three-tenths (2.3) percent of all Douglas-firs, containing 2.5 percent of the board foot volume were affected. The disease occurred in small, fairly discrete infection centers.

Though incidences of laminated root rot is low in the survey area, this is a very dangerous disease because of its persistence and damage potential. The pathogen survives in large roots and stumps for long time periods (up to 50 years) and spreads to new hosts via root contacts. Infection ultimately results in windthrow, butt rot, or tree death. Recommended control for laminated root rot is to cut all susceptible hosts in infection centers and a 50-foot buffer around each and (1) replant with resistant or intermediately susceptible conifers and/or immune hardwoods or (2) mechanically remove stumps and roots and replant with susceptible species.

Armillaria root rot was detected in three of 23 plots (13.0 percent) in the south-central and eastern portion of the survey area (figure 3). Six and two-tenths (6.2) percent of all Douglas-firs, containing 0.6 percent of the board foot volume was affected. The disease occurred mostly in suppressed, understory trees and in or around laminated root rot centers.

*Armillaria mellea* also survives in old stumps and roots and infects nearby trees across root contacts or by growing short distances through the soil. On the west side of the Cascade Mountains on Douglas-fir, *A. mellea* is generally

a weak pathogen that affects mainly stressed or injured trees. It frequently infects trees weakened by some other pathogen and in the survey area commonly was found in association with *P. weirii*. Recommended control of *A. mellea* is to "develop and maintain a vigorous stand."

Top sweep and crook was noted on trees throughout the stand. Ten and seven-tenths (10.7) percent of the Douglas-fir exhibited this kind of damage. In the small sample of crook-top trees felled, stain but no decay was found in association with the damage. Stain was limited to a small column of the heartwood within six feet of the crook. Isolations from stained wood produced imperfect fungi. No basidiomycetes, such as *Fomitopsis cajanderi*, that are usually associated with significant decay problems in broken-top Douglas-firs were isolated.

#### MANAGEMENT RECOMMENDATIONS

Basically, our survey of the Snow Creek Unit has revealed a vigorous, young stand with a small amount of localized root disease. There also is evidence of old top damage, but the trees have recovered well and appear to have suffered little, if any, loss due to decay. We recommend the following management activities for root disease control in the stand:

(1) Keep records of the occurrence of laminated root rot in the stand. Keep in mind where the disease is and, during the course of normal activity in the stand, monitor its activity.

(2) If possible, salvage root rot affected and potentially affected trees during commercial thinning operations. Choice of trees to be removed should be determined on the basis of frequency of entrance. If stands will be entered at five-year intervals, remove dead and visibly affected trees. If stands will be entered at six- to ten-year intervals, harvest all dead and visibly affected trees and all susceptible trees within 25 feet of visibly affected trees. If stands will be entered at intervals of greater than ten years, harvest all dead and visibly infected trees and all susceptible trees with 40 feet of visibly affected trees.

(3) At the time of final harvest, delineate laminated root rot centers by observing stain occurring on freshly-cut stump surfaces. Within centers and a 50 foot buffer around each either (a) remove all stumps with heavy equipment and replant with Douglas-fir or (b) leave stumps but replant the area with western hemlock, western redcedar, and/or red alder (preferably the latter two species).

(4) When regenerating the stand after final harvest, use local seed source planting stock and high quality planting techniques to minimize likelihood of *Armillaria* root rot damage. After trees are established, employ as many management activities that increase or maintain tree vigor as possible.

DIAMETER CLASS	DOUGLAS FIR	HEMLOCK CEDAR	TOTAL ALL CLASSES
2	.0	.0	.0
4	3.2	.0	3.2
6	8.9	.0	8.9
8	3.2	15.8	19.0
10	15.8	.0	15.8
12	9.5	.0	9.5
14	28.5	.0	28.5
16	37.9	.0	37.9
18	25.3	.0	25.3
20	3.2	.0	3.2
22	6.3	.0	6.3
24	3.2	.0	3.2
26	.0	.0	.0
TOTAL	145.0	15.8	160.8
PERCENT	90.2	9.8	100.0

Table 1: Mean basal area per acre (ft<sup>2</sup>) for Snow Creek survey area.

DIAMETER CLASS	DOUGLAS FIR	HEMLOCK CEDAR	TOTAL ALL CLASSES
2	.0	.0	.0
4	36.3	.0	36.3
6	45.2	.0	45.2
8	9.1	45.4	54.5
10	29.0	.0	29.0
12	12.1	.0	12.1
14	26.6	.0	26.6
16	27.2	.0	27.2
18	14.2	.0	14.3
20	1.5	.0	1.5
22	2.4	.0	2.4
24	1.0	.0	1.0
26	.0	.0	.0
TOTAL	204.7	45.4	250.1
PERCENT	81.8	18.2	100.0

Table 2: Mean number of trees per acre for Snow Creek survey area.

DIAMETER CLASS	DOUGLAS FIR	HEMLOCK CEDAR	TOTAL ALL CLASSES
2	.0000	.0000	.0000
4	.0000	.0000	.0000
6	.2564	.0000	.2564
8	.2104	1.2806	1.4910
10	1.5136	.0000	1.5136
12	1.4941	.0000	1.4941
14	5.0158	.0000	5.0158
16	7.3230	.0000	7.3230
18	5.4992	.0000	5.4992
20	.7256	.0000	.7256
22	1.4987	.0000	1.4987
24	.7859	.0000	.7859
26	.0000	.0000	.0000
TOTAL	24.3227	1.2806	25.6033
PERCENT	95.0	5.0	100.0

Table 3: Mean volume per acre (Mbd. ft.) for Snow Creek Survey area.

DIAMETER CLASS	HEALTHY	P. WEIRII INFECTED	A. MELLEA INFECTED	TOTAL ALL CLASSES
2	.0	.0	.0	.0
4	4.0	.0	.0	4.0
6	2.5	.0	1.6	4.1
8	8.0	.0	1.7	9.7
10	10.5	1.8	.0	12.3
12	6.5	.8	.0	7.3
14	34.4	.0	.0	34.4
16	43.5	.8	.0	44.3
18	31.9	.0	.0	31.9
20	4.0	.0	.0	4.0
22	8.0	.0	.0	8.0
24	.0	.8	.0	.8
26	.0	.0	.0	.0
TOTAL	153.3	4.2	3.3	160.8
PERCENT	95.3	2.6	2.1	100.0

Table 4: Mean basal area per acre (Mbd. ft.) affected by root diseases in Snow Creek survey area.

DIAMETER CLASS	HEALTHY	P. WEIRII INFECTED	A. MELLEA INFECTED	TOTAL ALL CLASSES
2	.0	.0	.0	.0
4	45.6	.0	.0	45.6
6	12.7	.0	8.5	21.2
8	22.8	.0	4.8	27.6
10	29.2	3.0	.0	22.2
12	8.3	1.1	.0	9.4
14	32.1	.0	.0	32.1
16	31.4	.6	.0	32.0
18	18.0	.0	.0	18.0
20	1.8	.0	.0	1.8
22	3.0	.0	.0	3.0
24	.0	.3	.0	.3
26	.0	.0	.0	.0
TOTAL	194.9	5.0	13.3	213.2
PERCENT	91.4	2.3	6.2	100.0

Table 5: Mean number of trees per acre affected by root diseases in Snow Creek survey area.

DIAMETER CLASS	HEALTHY	P. WEIRII INFECTED	A. MELLEA INFECTED	TOTAL ALL CLASSES
2	.0000	.0000	.0000	.0000
4	.0000	.0000	.0000	.0000
6	.0000	.0000	.0552	.1061
8	.7140	.0000	.1081	.8221
10	1.0424	.1543	.0000	1.1967
12	.9988	.1284	.0000	1.1272
14	6.0447	.0000	.0000	6.0447
16	8.2902	.1927	.0000	8.4829
18	6.9169	.0000	.0000	6.9169
20	.9127	.0000	.0000	.9127
22	1.8850	.0000	.0000	1.8850
24	.0000	.2069	.0000	.2069
26	.0000	.0000	.0000	.0000
TOTAL	26.8556	.6823	.1633	27.7012
PERCENT	97.0	2.5	.6	100.0

Table 6: Mean volume per acre (Mbd. ft.) affected by root diseases in Snow Creek survey area.

FIGURE 1: Location of Snow Creek Plantation, Quilcene District.

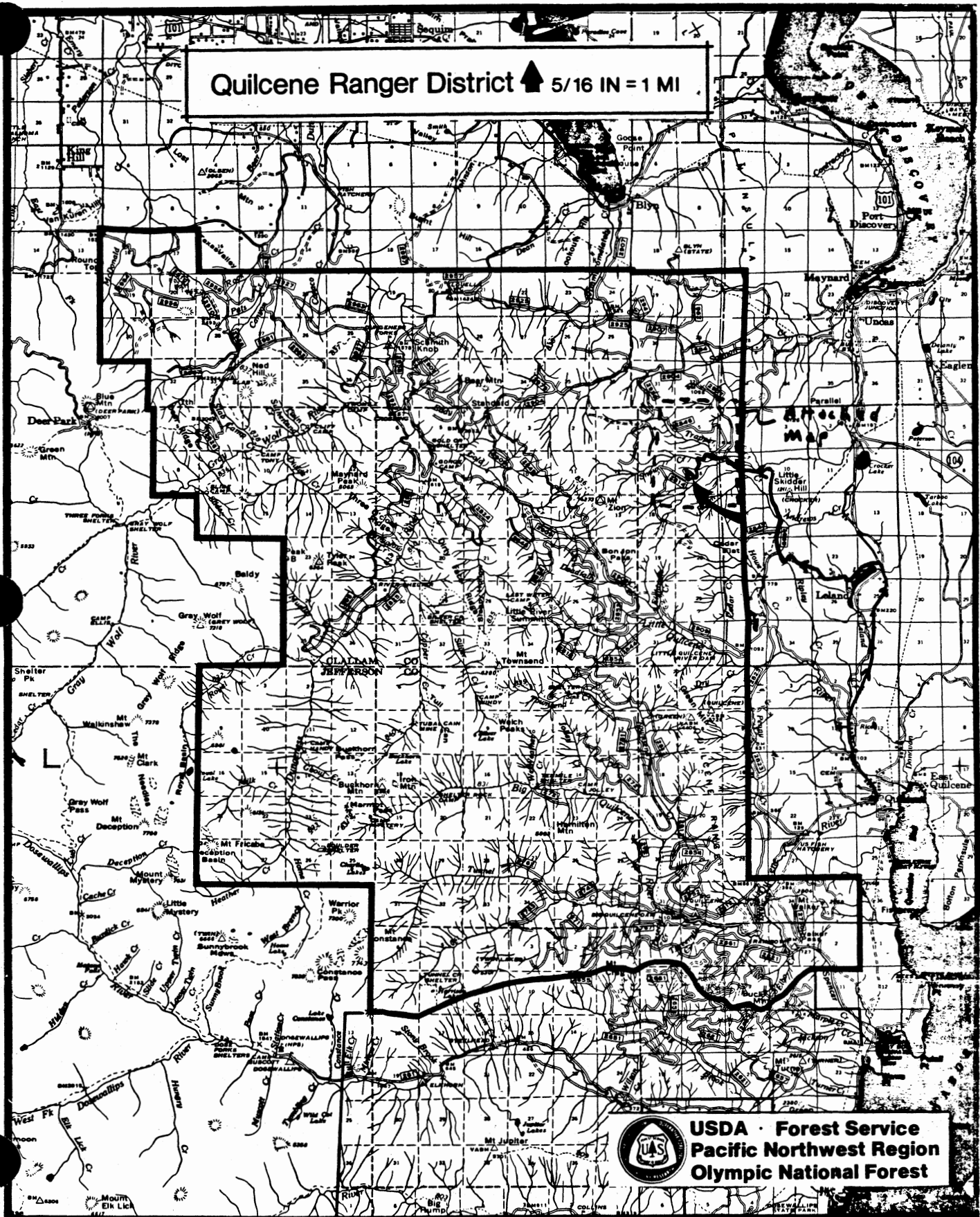




FIGURE 2: Location of Survey area,  
Snow Creek Unit.

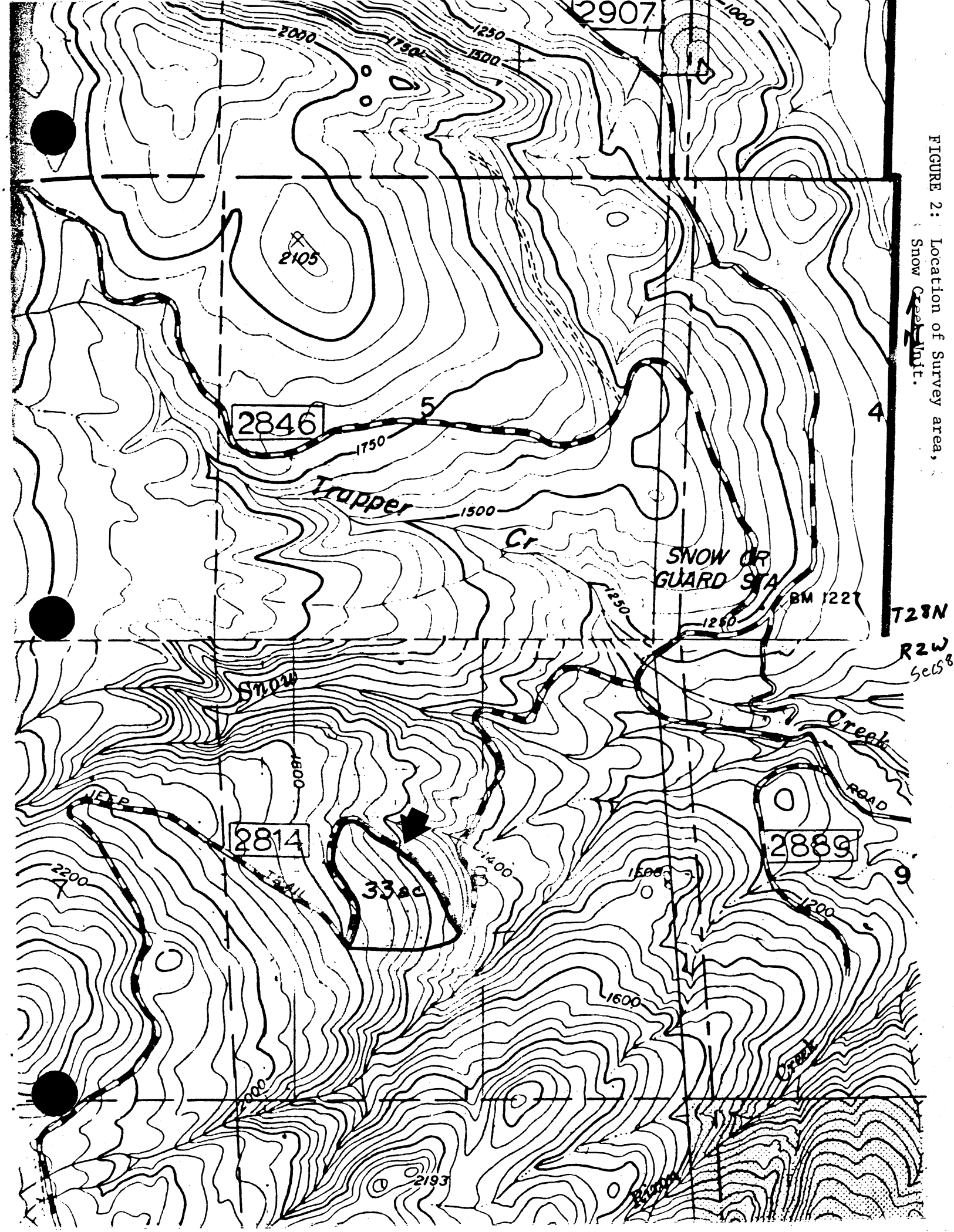
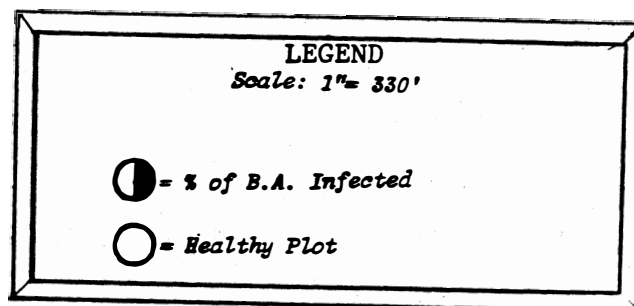
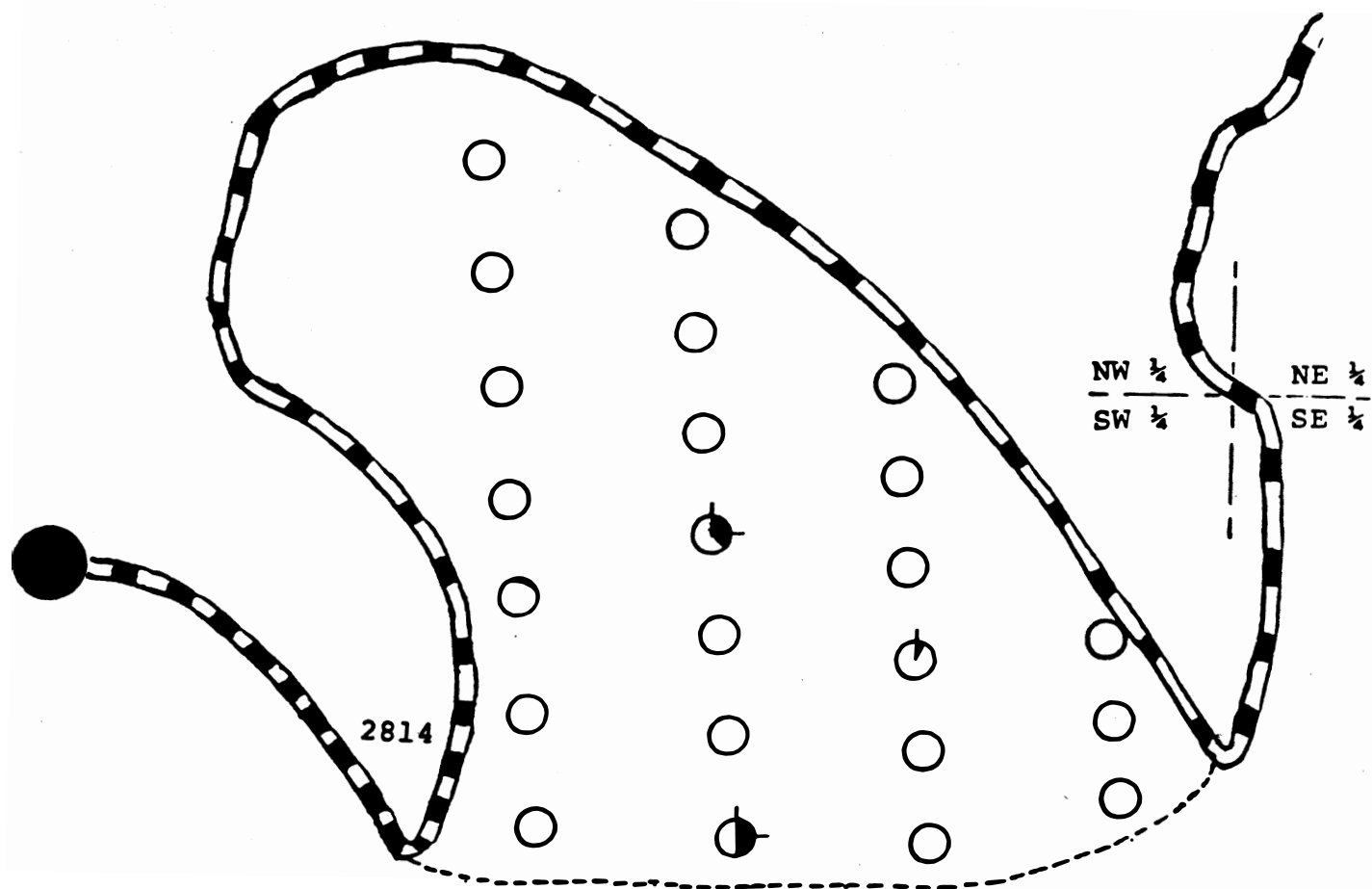


FIGURE 3: Location of plots in Snow Creek survey area:  
Laminated root rot was found in plots with arm  
pointing right; Armillaria root rot was found  
in plots with arm pointing upward.

SECTION 8  
RICKETTS SNOW CREEK



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